

OV Series

OVERVOLTAGE PROTECTION UNITS

OV1, 2, 3 & 4

Instruction Manual

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Test Equipment Maintenance Department
Location: -
ID 0338 01



Coutant Electronics Ltd.

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Section 1

1.1 Introduction

Coutant OV Series units are designed to protect voltage sensitive components connected to the output terminals of standard Coutant 'A' Series power supplies. Voltage rise beyond a certain limit results in the firing of a "Crowbar" SCR which clamps the output of the unit at zero.

With the exception of OV4 the overvoltage units connect directly to the tagblock of the power supply and are completely self contained. Alternatively the units can be connected into the cable form remote from this unit.

Four versions cover the entire 'A' Series range of power supplies from 0.5 to 50 amps.

Section 2

2.1 Specification

	Range 1	Range 2
Overvoltage Limits:	8.5 — 35V	4.5 — 13V
Temperature Range	-10°C — + 65°C	
Temperature Coefficient	0.02%/°C	0.1%/°C
Setting Resolution:	100mV	60mV
Minimum Threshold Setting for protection over full temperature range.	O/P volts + 5% Nom. O/P volts + 10%	
Delay Time:		
Normal	20μS (set at factory)	
Minimum	3μS by removal of link	
Maximum	10mS to special order	

Size	OV1	1 $\frac{7}{8}$ " (48mm)	2 $\frac{3}{4}$ " (70mm)	3 $\frac{1}{4}$ " (83mm)	2 $\frac{1}{2}$ oz. (71gms.)
	OV2	2 $\frac{1}{4}$ " (58mm)	2 $\frac{3}{8}$ " (61mm)	4 $\frac{3}{16}$ " (107mm)	4 $\frac{1}{2}$ oz. (127.5gms.)
	OV3	2 $\frac{1}{4}$ " (58mm)	2 $\frac{3}{8}$ " (61mm)	4 $\frac{3}{16}$ " (107mm)	2 $\frac{1}{2}$ oz. (127.5gms.)

Section 2

2.2 Selection Table

TYPE	ASA	ASB	ASC
OV1	50 to 300	50 to 300	50 to 200
OV2	500 to 1000	500 to 1000	300 to 1000
OV3	1500 to 2000	1500	
OV4*	3000 to 5000	2000 to 3000	1500 to 3000

*This unit is supplied as an integral part of the power supply.

Section 3

Setting up Procedures

If supplied fitted to a power supply the overvoltage unit is set with an O/V limit 10% above the nominal O/P voltage. Subsequent changes to this level are made as follows:

- 3.1 Unclip the cover which is an interference fit on the printed circuit board.
- 3.2 Turn the O/V potentiometer (RV1) fully anticlockwise (max).
- 3.3 Monitor the O/P voltage with a suitable voltmeter and set the O/P voltage to the desired O/V limit with the front panel control.
- 3.4 Turn the O/V board potentiometer slowly clockwise until the O/P voltage falls to zero.
- 3.5 Switch off the power supply, turn the O/P potentiometer fully anti-clockwise and switch on the unit once more.
- 3.6 Check the trip level by increasing the O/P voltage and re-set the O/V limit if necessary.
- 3.7 When the unit is adjusted satisfactorily, re-set the power supply to the required output voltage.

- 3.8** The O/V unit is normally set with a delay time of $20\mu\text{S}$. This time can be reduced to $3\mu\text{S}$ by the removal of link LKA.

Note: Spikes may cause premature operation of the O/V unit at this reduced delay time.

If units are used in parallel, isolating diodes must be used.

Normally an overvoltage limit of not less than 105% of the nominal O/P voltage on voltage range 1 and 110% on voltage range 2 is necessary but reduction of this level is permissible if a reduced temperature range is used. The minimum limit for a given temperature range can be calculated from a combination of temperature coefficient, temperature range, setting resolution and O/P ripple of the power supply.

Section 4

Trouble Shooting

Should O/P voltage fail to establish when the unit is switched on, check both power supply and OV board in the following order:

- 4.1** Check fuses, (units fitted with OV3 and OV4 have internal fuses).
- 4.2** Check whether link LKB is in circuit on the OV board. This link is inserted for low voltage operation (4.5 – 13V) only.
- 4.3** Turn O/P potentiometer fully anticlockwise and again re-set power supply by turning off and on.
- 4.4** Turn O/V pot fully anticlockwise and again re-set power supply.
- 4.5** Switch off mains and remove fanning strip from the O/V terminal block. Remove O/V board from power supply and reconnect fanning strip directly to P.S.
- 4.6** If O/P rails establish O/V unit is faulty and component function should be investigated or the unit returned to the factory.

Section 5

Fitting OV units to 'A' series power supplies

5.1 OV1, OV2, and OV3 units. These units directly connect to the power supply terminal block and all connections are transferred to the OV unit terminal block.

Procedure:

1. Switch off mains supply.
2. Remove and discard the terminal block screws securing the fanning strip or input and output connections.
3. Stand the power supply on its blank end panel and place the spacers supplied with the OV unit over the terminal block screw holes.
4. Remove the OV unit cover and locate the unit over the power supply terminal block, aligning the holes in the P.C.B. with those of the spacers. Insert the screws supplied with the OV unit through the holes and fully tighten.
5. Connect the fanning strip or input/output leads to the tag block on the OV unit. Replace the cover.
6. Remove R22 from the power supply amplifier P.C.B. and carry out the set-up procedures outlined in section 3.

Section 6

6.1 Circuit Description OV1

Output overvoltage protection circuits are completely self-contained, deriving power from the output of the power supply.

The circuit operation is best understood by also referring to the circuit diagram.

A voltage derived from the output by potential divider R4 and RV1 is

compared by VT2 with a fixed reference voltage across zener diode MR3 (high voltage range) or MR2 (low voltage range). VT3 and VT4 provide a constant current source to drive the zener over a wide voltage range. Link LKB is inserted for low voltage operation.

When the voltage across the potential divider exceeds the zener voltage sufficiently to cause comparator VT2 to conduct, the resulting signal, amplified by VT1, fires SCR1. SCR1 clamps the 'P' terminal and the positive output rail via MR1 to the negative output rail.

6.2 Circuit Description OV2, OV2, OV4.

A voltage derived from the output by potential divider R4 and RV1 is compared by VT2 with a fixed reference voltage across zener diode MR4 (high voltage range) or MR3 (low voltage range). VT3 and VT4 provide a constant current source to drive the zener over a wide voltage range. Link LKB is inserted for low voltage operation.

When the voltage across the potential divider exceeds the zener voltage sufficiently to cause comparator VT2 to conduct, the resulting signal, amplified by VT1, fires SCR2. SCR2 causes SCR1 to fire, clamping the 'P' terminal and the positive output rail via MR1 to the negative output rail.

6.3 General

If the overvoltage condition has been caused by other than a series element failure the unit will go into the overcurrent protection condition and only a few milliamps will be drawn from the supply. Series element failure will result in a large current surge through SCR1 blowing fuse FS1 and isolating the negative output rail from the load.

A delay is introduced between the appearance of the overvoltage condition and the firing of the SCR by the insertion of LKA.

Link LKC is normally connected between points 1 and 3 except when the power supply is used as a standby unit in parallel with a second power supply. In this case an isolating diode is connected in series with the negative rail before the sensing point, and LKC is inserted between points 1 and 2.

OV1 and OV2 have the d.c. fuse and main crowbar SCR.1. on the O.V. P.C. board, with the whole assembly external to the power supply.

OV3 has the d.c. fuse inside the power supply with the main crowbar SCR.1. on the O.V. P.C. board external to the power supply.

OV4 is mounted completely inside the power supply.

Section 7

OV Units ½A to 3A output OV1 Parts List P.C. 382

Resistors ½W 5% Carbon unless otherwise stated.

R1	100 Ω
R2	100 Ω
R3	10K
R4	2K 5% High Stab
R5	1K
R6	4.7K
R7	100 Ω
R8	910 Ω
R9	1.8K
R10	10K

RV1	10K	WL18 or MP31	Reliance M.E.C.
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Capacitors

C1	0.047 μF	160V	Wima Tropyfol M
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Diodes

MR1	1N5400	Westinghouse
MR2	3.3V Zener BZY88C3V3	Mullard
MR3	6.2V Zener BZY88C6V2	Mullard

Silicon Controlled Rectifiers

SCR1	2N4184	Motorola
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Transistors

VT1	BC107	Mullard
VT2	ME0413	Micro Electronics
VT3	ME0413	Micro Electronics
VT4	BC107	Mullard

Terminal Block

77/593/SM	Cinch
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OV2, OV3 & OV4

Resistors ½W 5% Carbon unless otherwise stated.

R1	10Ω		
R2	10Ω		
R3	10K		
R4	2K	2% High Stab.	
R5	1K		
R6	4.7K		
R8	560Ω		
R9	1.8K		
R10	10K		
R11	10Ω		
R12	10Ω		
R13	100Ω		
RV1	10K	WL18 or MP31	Reliance M.E.C.

Capacitors

C1	0.047μF	160V	Wima Tropyfol M
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Diodes

MR1	IN914		Texas Instruments
MR2	IN4003		Motorola
MR3	3.3V Zener	BZY88C3V3	Mullard
MR4	6.2V Zener	BZY88C6V2	Mullard
MR5	IN4003		Motorola

Silicon Controlled Rectifiers

SCR1	2N3896 (OV2 & OV3)	R.C.A.
SCR1	29T1 (OV4)	Westinghouse Brake
SCR2	2N5061	Motorola

Transistors

VT1	BC107	Mullard
VT2	BCY72	Mullard
VT3	BCY70	Mullard
VT4	BC107	Mullard

P.C.B.

PC383 (OV2)

PC405 (OV3)

PC406 (OV4)

Terminal Block

(OV2) 44/77/903/8M Cinch

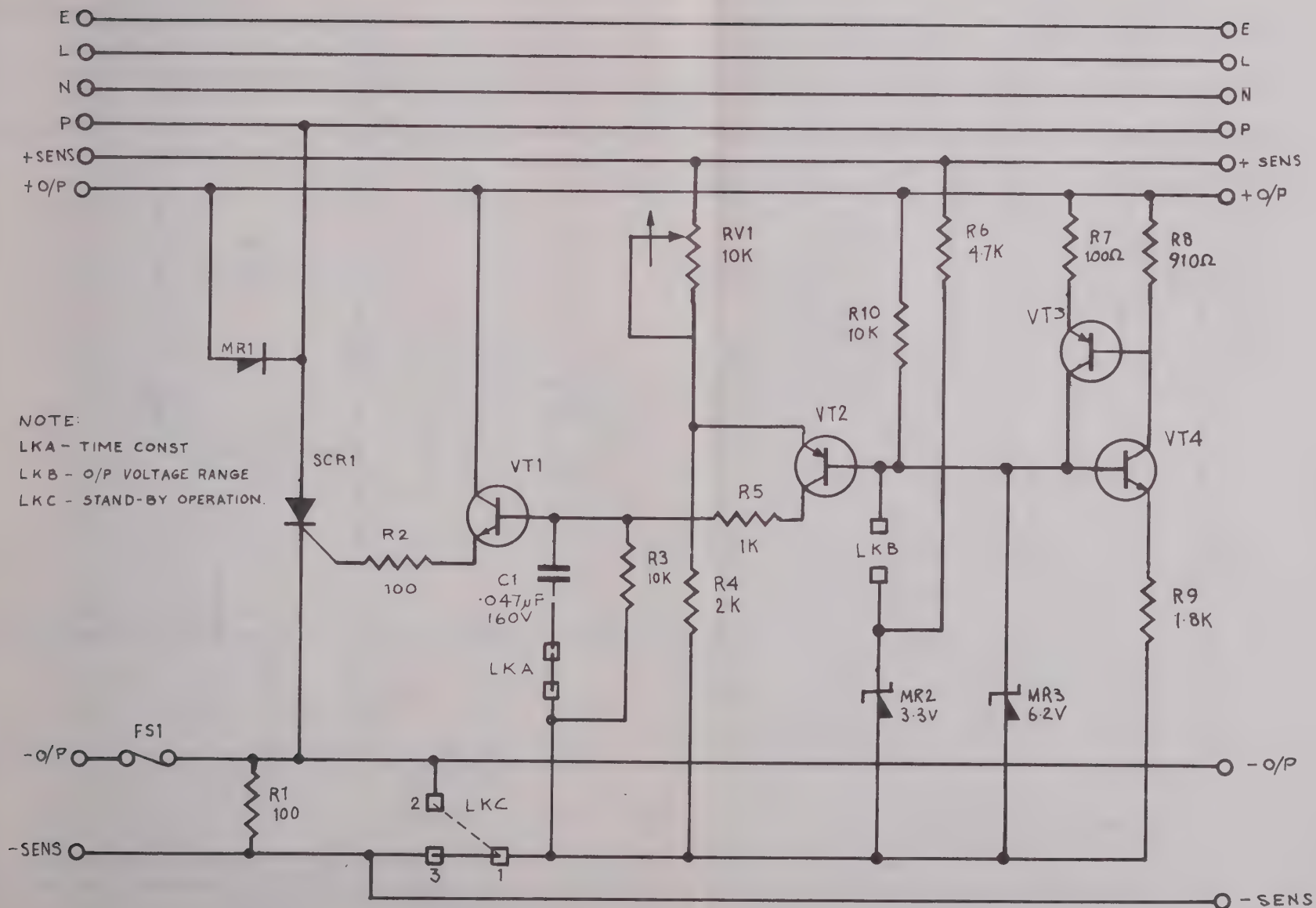
(OV3) 44/77/903/3M Cinch

D.C. Fuse Table

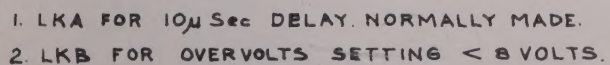
½ amp unit	1A	TDC14
1 amp unit	2A	TDC14
2 amp unit	3A	TDC14
3 amp unit	5A	TDC14 OV1 TDC10 OV2
5 amp unit	7A	TDC10
7 amp unit	10A	TDC10
10 amp unit	15A	TDC10

Fuse manufacturer K. Beswick Ltd.

15 amp unit	20A	English Electric
20 amp unit	30A	
30 amp unit	40A	



O/V1 Circuit



OV 2-3-4 Circuit

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